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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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Bruce Liikanen

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HANSRA PATENT SERVICES
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EXAMINER

NEGRON, DANIEL L

ART UNIT

PAPER NUMBER

2627

DATE MAILED: 04/20/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/954,997

Applicant(s)

LIIKANEN ET AL.

Examiner

Daniell L. Negrón

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 22 March 2006.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-7,9-27,30-36,39-41,44-73,75 and 77 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-4,6,7,9-17,19-27,30-36,39,40,44-73,75 and 77 is/are rejected.
- 7) ☒ Claim(s) 5,18,41,74 and 76 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 22 March 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Specification

1. The amendment filed March 22, 2006 is objected to under 35 U.S.C. 132(a) because it introduces new matter into the disclosure. 35 U.S.C. 132(a) states that no amendment shall introduce new matter into the disclosure of the invention. The added material which is not supported by the original disclosure is as follows:

On page 12, line 18, the addition of "and approximately 45 degrees at the outer diameter 76" is considered new matter.

Applicant is required to cancel the new matter in the reply to this Office Action.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claims 17-25, 36, 44, and 62 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claims contain subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. Regarding claims 17, 36, and 44, the specification does not appear to provide support for the recitation regarding the skew angle being "zero degrees when said read element and said write element are located at a position off of said data storage region".

Regarding claims 18-25 and 62, claims 18-25 and 62 are dependent on independent claim 17 and are therefore rejected for the reasons discussed above.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 1-4, 6, 7, 9-13, 15-17, 19-22, 24-27, 30-36, 39, 40, 44, 45, 60-65, 68-73, 75, and 77 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nunnelley U.S. Patent No. 6,778,343.

Regarding claims 1 and 6, Nunnelley discloses a disk drive comprising a magnetic disk (312) having an annular data storage region between inner and outer diameters (Fig 4B) and an actuator arm assembly (346) including an actuator arm (334), a flexure arm (332) and a read element and a write element (attached to slider 330) wherein the actuator arm assembly rotates about a second end (336) of the actuator arm opposite the first end of the actuator arm, the read element reads from the disk and the write element writes to the disk (column 5, lines 7-32).

Nunnelley discloses a disk drive wherein at least one of the read element skew angle and the write element skew angle decreases as the read element and the write element move from the inner diameter to the outer diameter (column 2, lines 59-62), but fails to explicitly disclose read and write element skews never being less than 45 degrees or being 90 degrees while the read element and write element are located over the data storage region.

However, Nunnelley discloses that decreasing the skew during movement of the read and write elements from the inner diameter to the outer diameter of the disk allows for the track pitch to increase toward the outer diameter. Nunnelley further discloses that skew and track pitch

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should be determined based on the variable physical properties of the write element for the purpose of compensating for such variance and obtaining a desired track pitch (column 1, lines 40-60).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to use such skews (e.g., 45 degrees or greater), since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art (*In re Aller*, 105 USPQ 233).

Regarding claims 2 and 3, Nunnelley discloses a disk drive wherein the data storage region has a plurality of concentric tracks which include sectors, the sectors including data sectors and servo sectors, and the servo sectors are written in a non-radially coherent manner by the write element due to the write element skew angle (column 4, lines 44-53, Fig. 4B and disclosure thereof).

Regarding claim 4, Nunnelley discloses a disk drive wherein at least one of the read element and the write element is not perpendicular to a centerline of the flexure arm, and the centerline of the flexure arm is parallel to a centerline of the actuator arm (Fig. 2 and disclosure thereof).

Regarding claims 7, 9-11, have limitations similar to those treated in the above rejection of claims 1-4, and are met by the reference as discussed above.

Regarding claims 12, 13, 15, and 16, Nunnelley discloses a disk drive wherein the data storage region includes a plurality of concentric data tracks each having a width associated therewith (Fig. 4B and disclosure thereof).

Furthermore, the reference is considered to meet the limitations since the angle between the data track and read or write head forms a right triangle. A well-known trigonometric identity teaches that the cosine of the opposite angle (i.e. skew angle) equals the quotient of the adjacent side (i.e. data track width) divided by the hypotenuse (i.e. write head width). Therefore, since the widths of the tracks and heads correspond to the sides of a right triangle, the identity discussed above can be manipulated in order to discover the correspondence of any value to the cosine as well as the inverse cosine of the skew angle.

Regarding claims 17, 19-21, 26, 27, 30, and 31, claims 17, 19-21, 26, 27, 30, and 31 have limitations similar to those treated in the above rejections, and are met by the reference as discussed above.

Regarding claims 22, 24, and 25, claims 22, 24, and 25 have limitations similar to those treated in the above rejections of claims 12, 13, and 15 respectively, and are met by the reference as discussed above.

Regarding claim 32, claim 32 has limitations similar to those treated in the above rejection of claim 7, and are met by the references as discussed above. Claim 32 however also recites the following limitations:

A disk drive wherein the width of at least one of the write element and the read element is greater than the track width for each of the plurality of concentric data tracks as Nunnelley shows in element 110 in Fig. 1.

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Regarding claims 33 and 34, claims 33 and 34 have limitations similar to those treated in the above rejections of claims 10 and 11 respectively, and are met by the references as discussed above.

Regarding claim 35, Nunnelley discloses a disk drive wherein the head is mounted on the flexure arm such that at least one of the read element and the write element is not perpendicular (see elements 230 and 232) to a centerline of the flexure arm.

Regarding claim 36, Nunnelley discloses a disk drive wherein the skew angle is zero degrees (219) when the head is located at a position off of the data storage region (Fig. 2 and disclosure thereof).

Regarding claim 39, claim 39 has limitations similar to those treated in the above rejections of claims 7 and 9, and are met by the references as discussed above.

Regarding claims 40, claims 40 have limitations similar to those treated in the above rejections, and are met by the reference as discussed above.

Regarding claim 44, claim 44 has limitations similar to those treated in the above rejections of claims 7 and 9 respectively, and are met by the references as discussed above.

Regarding claim 45, method claim 45 is drawn to the method of using the corresponding apparatus claimed in claims 7 and 12. Therefore method claim 45 corresponds to apparatus claims 7 and 12 and is rejected for the same reasons of obviousness as used above.

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Regarding claims 60-64, Cunningham discloses a disk drive wherein the read element and the write element are located on a head and wherein the head is substantially rectangular in shape (see Figs. 1 and 2 and disclosure thereof).

Regarding claims 65-67, method claims 65-67 are drawn to the method of using the corresponding apparatus claimed in claims 60-64. Therefore method claims 65-67 correspond to apparatus claims 60-64 and are rejected for the same reasons of obviousness as used above.

Regarding claims 68-73, 75, and 77 have limitations similar to those treated in the above rejections, and are met by the reference as discussed above.

6. Claims 14 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nunnelley U.S. Patent No. 6,778,343 in view of Nepela et al U.S. Patent No. 5,793,550.

Regarding claim 14, Nunnelley discloses a disk drive with all the limitations of claim 7 as discussed above, but fails to show a signal-to-noise ratio produced by the read element being at least 6 dB.

However, Nepela et al discloses a read head wherein the output current applied is optimize for the purpose of improving the signal to noise ratio (column 3, lines 56-65).

Therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to combine the disk drive as disclosed by Nunnelley with the read head current optimization as taught by Nepela et al in order to increase the signal-to-noise ratio of the signal read by the magnetic head and hence to improve the quality of the output signals.

Regarding claim 23, claim 23 has limitations similar to those treated in the above rejection of claim 14, and are met by the references as discussed above.

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7. Claims 46-59, 66, and 67 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nunnelley U.S. Patent No. 6,778,343 in view of Cunningham et al U.S. Patent No. 5,790,341.

Regarding claims 46-48, Nunnelley discloses a method with all the limitations of claim 45 as discussed above, but fails to show a skewing step further including selecting the slew angle such that the width tolerance is increased by at least 30 percent.

However, Cunningham et al discloses a method of changing the effective widths of the heads and thereby modifying the tolerance by skewing the head in a disk drive for the purpose of increasing the amplitude of the read signal for the purpose of improving the performance of the head (column 7, line 36 through column 8, line 7).

Therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to combine the method disclosed by Nunnelley with the method of skewing the head as taught by Cunningham et al in order to reduce interference in a read head and further to increase the amplitude of the read signal. Furthermore the percentage of the tolerance increase is considered merely readjusting the elements and no unexpected result is to occur.

Regarding claims 49-59, claims 49-59 have limitations similar to those treated in the above rejections of claims 46-48 respectively, and are met by the references as discussed above.

Regarding claims 66 and 67, Nunnelley discloses a method wherein the step of providing a head comprises providing a head, which is substantially rectangular in shape (see Fig. 1 and disclosure thereof).

Allowable Subject Matter

8. Claims 5, 18, 41, 74, and 76 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Regarding claims 5, 18, 41, and 76, prior art fails to disclose a disk drive as recited in independent claims 1, 17, 32, and 68 wherein at least one of a read and write element is mounted on a flexure arm such that at least one of the elements is perpendicular to a centerline of the flexure arm and the flexure arm is mounted on the actuator arm such that the centerline of the flexure arm is not parallel to a centerline of the actuator arm.

Regarding claim 74, prior fails to disclose a disk drive as recited in claim 68, wherein the physical widths are at least double the effective widths at the inner diameter.

Response to Arguments

9. Applicant's arguments with respect to claims 1-7, 9-27, 30-36, 39-41, and 44-67 have been considered but are moot in view of the new grounds of rejection.


Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Daniell L. Negrón whose telephone number is 571-272-7559. The examiner can normally be reached on Monday-Friday (8:30am-5:00pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wayne R. Young can be reached on 571-272-7582. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

DLN 
April 10, 2006


WAYNE YOUNG
SUPERVISORY PATENT EXAMINER